Faculty of matter Sciences and Computer Science
Department of Physics – L2_Physics
Exercise Series of Liquid Mechanics, 2025-2026
Exercise Series Number 1

Generalities

Exercise 1

Given a volume of oil $V = 6m^3$ weighing $w = 47\ kN$.

1. Calculate the mass density, specific weight, and the density of this oil, knowing that $g = 9{,}81\ m/s^2$.
2. Then, calculate the weight w and the mass M of a volume $V = 3\ liters$ of gearbox oil with a density of 0.9.

Exercise 2

Determine the specific weight of gasoline, given that its specific gravity 7*d*=0.7. The following data is provided:

- Acceleration due to gravity $g = 9{,}81\ m/s^2$
- Density of water $\rho = 1000\ kg\ /m^3$

Exercise 3

Determine the dynamic viscosity of a motor oil with a specific gravity d=0.9*d*=0.9 and kinematic viscosity $\nu\ = 1.1St$.

Exercise 4

The viscosity of water at 20°C is 0.01008 Poise. Calculate:

1. The absolute (dynamic) viscosity.
2. If the density is 0.988, calculate the kinematic viscosity in m^2/s and in Stokes.

Exercise 5

Fuel at a temperature of T = 20°C has a dynamic viscosity of $\mu\ =\ 95\ \times\ 10^{-3} Pa.s$.
Calculate its kinematic viscosity in stokes, given that its density is d = 0.95.
The mass density of water is given as $1000\ kg/m^3$.

Exercise 6

A liquid is compressed whose parameters in the initial state are : $P_1 =\ 50\ bar$ and $V_1 =\ 30.5\ dm^3$ and parameters at the end-state are : $P_2 =\ 250bar$ et $V_2 =\ 30dm^3$.

Calculate the compressibility coefficient β of this liquid.